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GB 1598125 A GB 1067285 A

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(71) Applicant(s)
David Fairbank
41 Woodcross Avenue, Cantley Manor, DONCASTER, DN4 6RU, United Kingdom

(72) Inventor(s)
David Fairbank

(74) Agent and/or Address for Service
Appleyard Lees
15 Clare Road, HALIFAX, West Yorkshire, HX1 2HY, United Kingdom

(54) Bollard refurbishment

(57) The present invention relates to a method of refurbishment of a plastics bollard shell.

A method of refurbishment includes submersing a bollard shell in heated fluid for a predetermined period, and mechanically urging the shell outwardly towards an expanded state.

The method may include the steps of mechanically cleaning the shell using wire brushes, ultrasonic wave generators, and chemical agents.

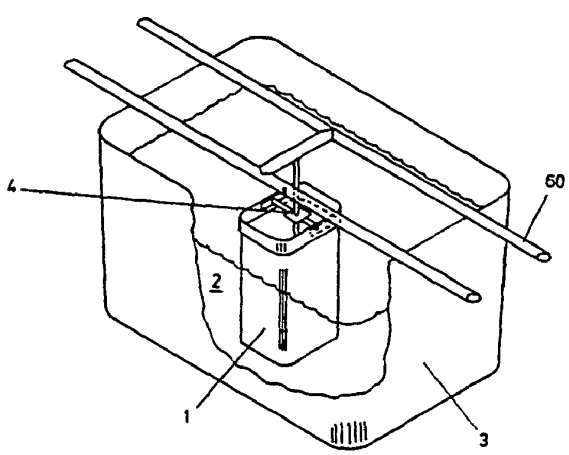

FIG. 2

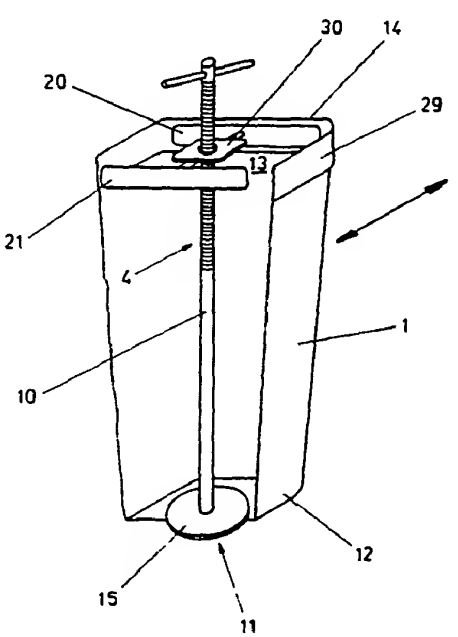

FIG. 3

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At least one drawing originally filed was informal and the print reproduced here is taken from a later filed formal copy.

This print takes account of replacement documents submitted after the date of filing to enable the application to comply with the formal requirements of the Patents Rules 1995

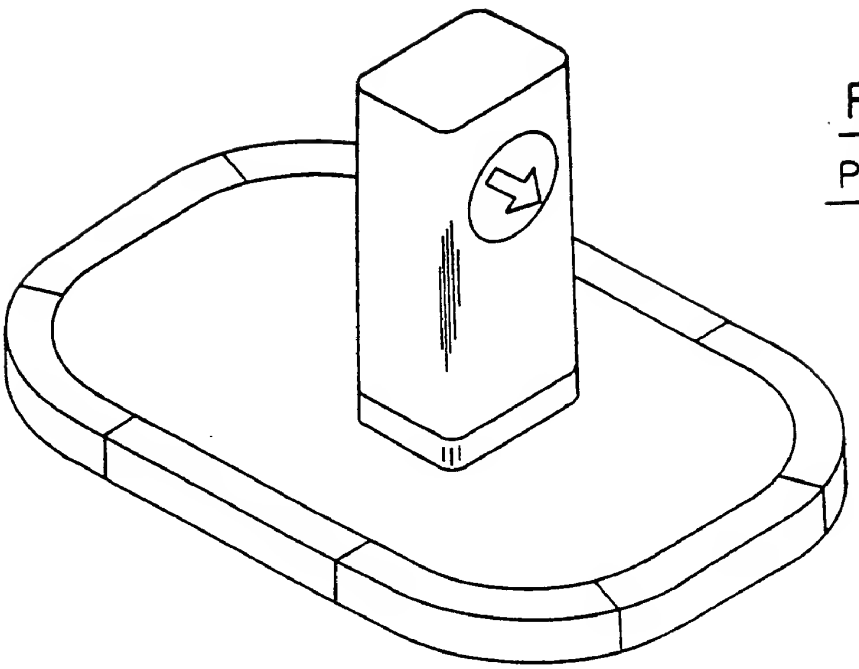

FIG. 1
PRIOR ART

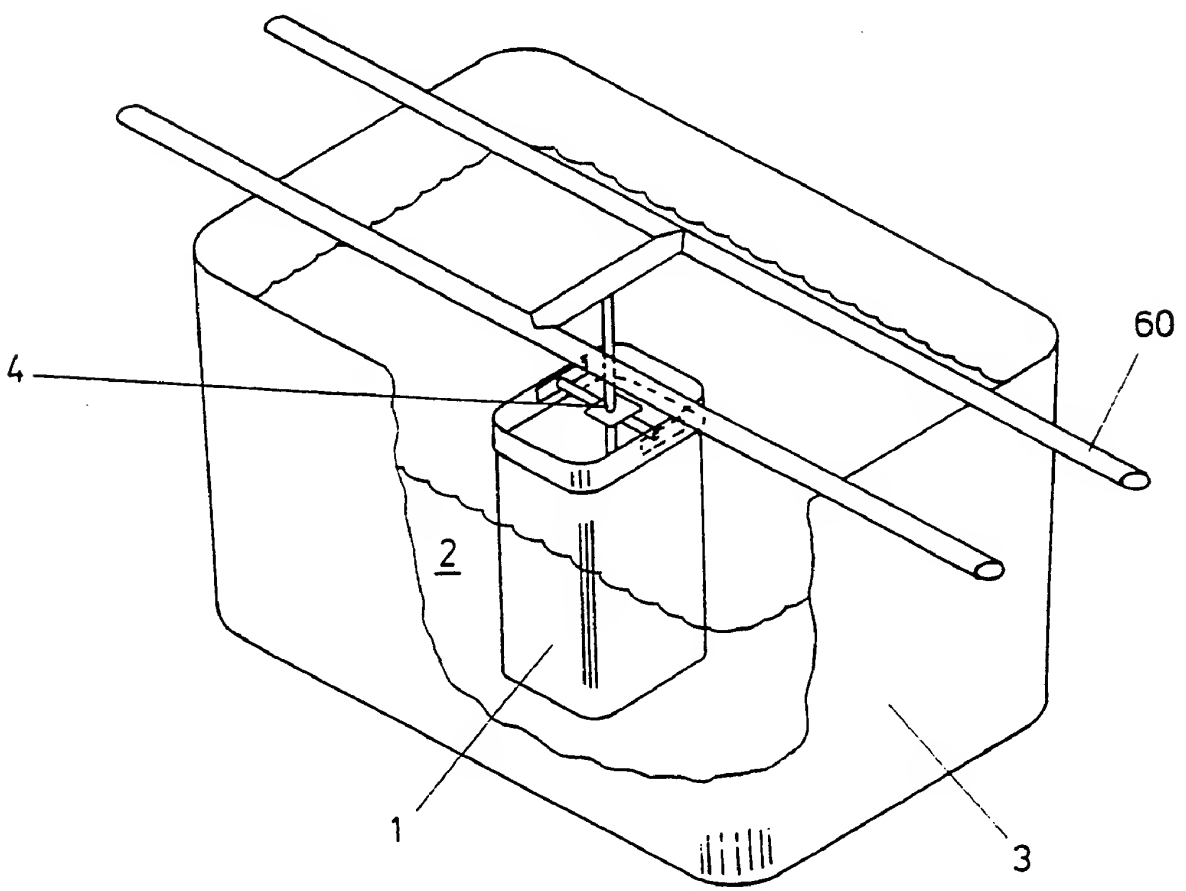

FIG. 2

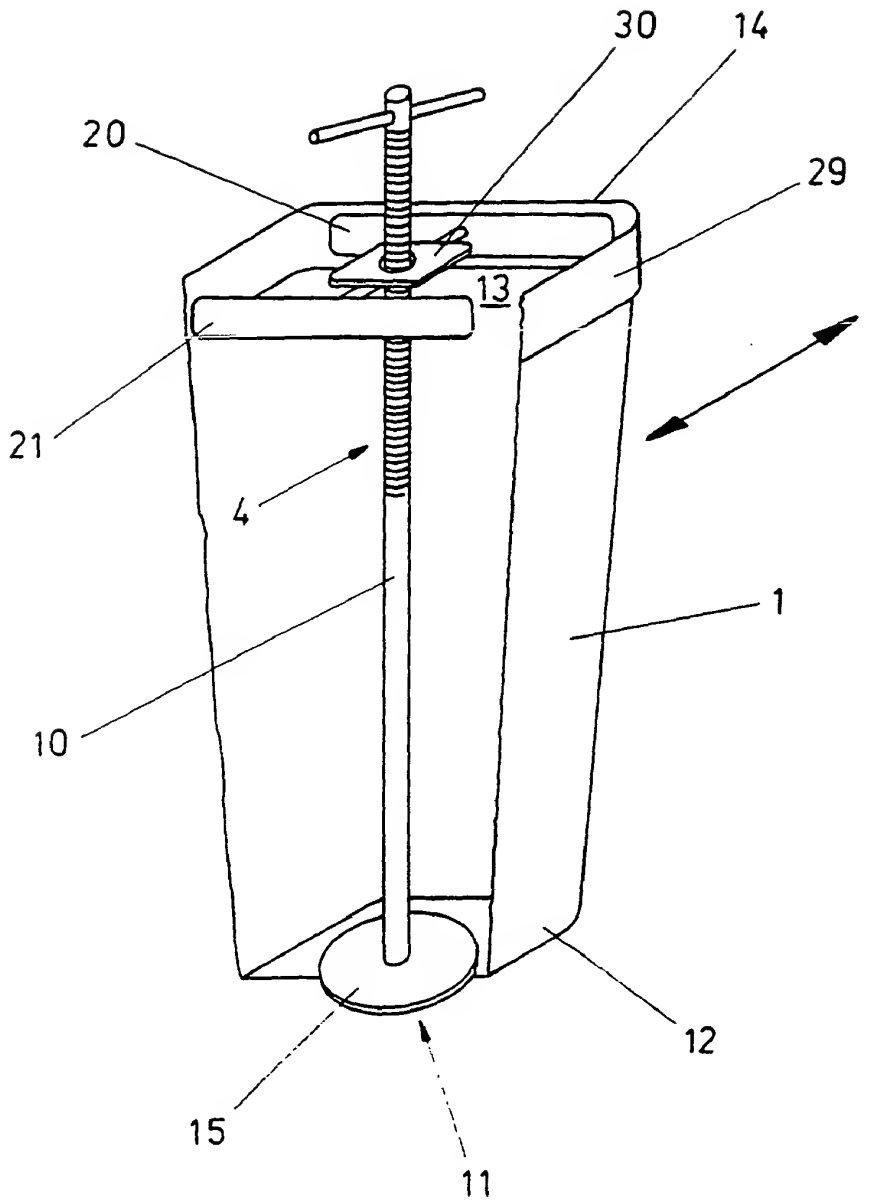

FIG. 3

BOLLARD REFURBISHMENT

The present invention relates to a method of refurbishment of bollards, for example plastics bollards as found in road traffic islands.

A conventional traffic bollard comprises a tubular hollow plastics shell having a closed upper end, there being four upright walls, and a lower rim for attachment to the ground. Such bollards are formed by, for example, injection moulding from a plastics material, and may have a sign, eg. an arrow, formed thereon. Generally, the plastics material may be translucent and of a light colour, for example white. An example of such a prior art traffic bollard is shown in figure 1 in a conventional traffic island placement.

However, there is a problem that such bollards often become damaged, for example if the bollard is hit by a car or is run over by a lorry, the bollard may be crushed and/or split. Otherwise, the bollard may be generally become dirty from road dirt splashed from passing vehicles.

Conventionally, once such a bollard has been run over, resulting in crushing or splitting of the bollard, the bollard must be discarded and a new bollard used in its place.

An object of the present invention is to provide a method of bollard refurbishment, to allow damaged bollards to be re-used.

According to one aspect of the present invention there is provided a method of refurbishment of a plastics bollard shell from a collapsed state to an expanded state, the method comprising the steps of:

(i) submersing the bollard shell in a heated fluid for a predetermined period; and

(ii) mechanically urging the bollard shell towards the expanded state.

Preferably the shell is urged towards the expanded state whilst the shell is submerged in the fluid.

Preferably the method comprises the step of subjecting the shell to sonic or ultrasonic vibrations which are transmitted through the fluid, whilst the shell is submerged in the fluid. Ultrasonic vibrations have been found to be particularly effective in removing surface dirt and grime from the shell. Ultrasonic vibrations applied through the fluid may be particularly effective in removing carbon deposits from exhaust fumes and the like, from the surface of the shell. The fluid need not be heated for the ultrasonic waves to clean the shell.

By subjecting the bollard to an ultrasonic or sonic wave generator, inaccessable holes or crevices on the surface of the plastics shell, and open pores, may be cleaned without the use of any additional manual labour.

Preferably the shell is submerged in a fluid which is heated to a temperature in the range 50-110°C. Suitably the temperature of the fluid is in the range 60-80°C.

Preferably, the shell is submersed in step (i) above for a predetermined period which is in the range one to seven hours, and suitably in the range two to five hours.

Chemical cleaning agents are preferably dissolved in the fluid, in order to clean the surfaces of the shell during the predetermined period.

Preferably, in said step (ii) above, the bollard shell is outwardly urged in a direction along a main length of the bollard, and in a direction transverse to the main length of the bollard. The shell may be urged outwardly in a gradual outwardly expanding movement; or in a set of small discrete step wise movements. In the expanded state, the shape of the bollard shell may closely resemble an original manufactured shape of the bollard shell.

Preferably, during the predetermined period the shell is completely surrounded by the fluid.

Preferably the shell is held in an inverted state in the fluid, such that fluid may be contained within the shell and around the shell. Preferably a lower rim of the inverted shell is expanded prior to expansion of the shell in the lengthwise direction.

The method preferably further comprises the step, with the bollard removed from the fluid, of locally heating an outer and/or inner surface of the shell to a temperature selected to melt a thin surface layer of the shell, and then allowing the melted thin surface layer to cool into a set state.

Before, after or during the stages (i) and (ii) above, the inner and/or outer surface of the plastics shell may be mechanically abraded.

The method may include the step of adhering a sticker to the bollard shell. The sticker may be a printed plastics sticker which sticks onto the bollard shell, to provide an arrow sign, or similar, on the shell.

The invention includes a method of refurbishment of a plastics shell, the method comprising the steps of:

(a) submersing the shell in a fluid for a predetermined period; and

(b) subjecting the shell to ultrasonic vibrations transmitted through the fluid.

The invention includes a bollard expansion apparatus for expanding a collapsed hollow plastics bollard shell into an expanded state in which the bollard shell substantially resumes its original manufactured shape, the apparatus comprising:

a fluid bath for containing a fluid; and

an expansion frame for expanding the bollard shell towards the original shape,

the apparatus being arranged such that the bollard shell can be submerged in the fluid in the bath such that the fluid completely surrounds inner and outer surfaces of the bollard, the frame being arranged to be

adjustable for expansion of the bollard shell from an initial collapsed state to the expanded state, in which the bollard substantially resumes its original manufactured shape.

Preferably the expansion frame comprises an elongate member having first and second ends, the elongate member arranged to fit in use, along a main length of the bollard shell between a lower end and an upper end thereof, the elongate member being provided with means for expanding a wall of the bollard in a direction transverse to the main length of the bollard, and means for expanding the bollard in a direction along the main length of the bollard.

Preferably the frame comprises means for laterally expanding the bollard at a position between the first and second ends, in a direction transverse to the main length of the bollard.

Preferably the means for expanding the bollard in a length wise direction comprises a threaded rod arranged to urge against a base plate. Preferably the base plate is secured at the lower end of the bollard, by the means for expanding the lower end of the bollard in a direction transverse to the main length of the bollard.

Preferably the means for expanding the lower end of the bollard in a direction transverse to the main length of the bollard comprises first and second plates arranged to face outwardly from the elongate member and extend in a direction transverse thereto.

Preferably, the frame comprises attachment means for attaching one end of the frame to the lower end of the bollard, for anchoring the frame to the lower end. The means for expanding the bollard in a direction along the main length of the bollard may urge against the attachment means.

For a better understanding of the invention, and to show how methods and embodiments of the same may be carried into effect, reference will now be made, by way of example, to the accompanying diagrammatic drawings, in which:

Figure 2 shows a plastics bollard undergoing a specific method of refurbishment according to the present invention, using a specific embodiment apparatus according to the present invention; and

Figure 3 shows a portion of a specific embodiment apparatus according to the present invention.

Referring to figures 2 and 3 of the accompanying drawings, there will now be described by way of example a specific method and apparatus according to the present invention, for refurbishing a plastics bollard.

A damaged plastics bollard, comprising a hollow tubular plastics shell, of for example translucent white PTFE, nylon, or other plastics material, the tube being closed off at an upper end and having a lower rim portion 3 at a lower end, may be received from a bollard installation in a crushed, split or otherwise damaged form. The bollard may have surface scrape marks, cuts, and ingrained dirt.

The plastics bollard may be refurbished as follows:

Firstly, the crushed or collapsed bollard shell 1 is brushed off with, for example a wire pad, to remove any loose ingrained tarmac, soil etc, or any marks which may be removed by mechanical abrasion of the surface of the plastics shell.

Secondly, the bollard shell is submersed upside down in a volume of heated fluid 2 contained in a bath or tank 3, such that the fluid, for example water, completely surrounds inner and outer surfaces of the bollard shell. The temperature of the fluid is selected, by experiment according to the type of plastics material of the bollard, to lie in a range in which prolonged submersion of the plastics shell of the bollard results in the shell becoming deformable and pliable. It has been found experimentally that for a PTFE plastics bollard, a fluid temperature in the range 60-80°C is suitable for rendering the PTFE plastics material into a suitably pliable state. Under such conditions, the bollard shell will naturally expand some way from its crushed or collapsed state, towards the original formed shape in which the bollard was originally manufactured.

During emersion in the fluid, a sonic or ultrasonic wave generator may be placed in the tank or bath 3, such that the sonic or ultrasonic waves are passed through the fluid. Use of the wave generator has been found in practice to give effective surface cleaning of the inner and outer surfaces of the shell, being particularly effective on removal of carbon based deposits from car exhausts or the like. The wave generator may also allow cleaning of crevices or pores in the shell material which are difficult to access with a wire brush or the like.

Where the bollard is immersed into the fluid prior to heating the fluid, the ultrasonic generator may be used whilst heating the fluid. The sonic or ultrasonic action of the wave generator may be applied at any fluid temperature.

Thirdly, an expansion frame 4, according to a specific embodiment of the present invention, is then placed within the bollard shell, as shown schematically in figure 3 of the accompanying drawings, in order to further expand the bollard shell under tension, towards the original shape, as the bollard is placed upside down in the fluid bath.

The expansion frame comprises an elongate rod member 10 having a first end 11 which locates at an upper end 12 of the shell of the bollard, and a second end 13 which locates at a lower end 14 of the bollard, the first end 11 being provided with a pressure plate member 15 for urging outwardly the upper end of the bollard, the rod 10 being rotatable with respect to the pressure plate 15, and the second end being provided with a laterally expandable plate arrangement comprising a left and a right plate 21, 22 respectively, the left and right plates being arranged to be moveable towards and away from each other by means of, for example a screw attached to a centre base plate member 30 through which the elongate rod 10 passes. The left and right lateral plates 20, 21 may be screwed outwards away from each other to urge against a lower rim portion 20 of the bollard shell in order to hold the frame rigidly within the shell, whilst the elongate rod member 10 may be urge in a direction along a main length of the bollard shell such that when the lateral plates 20, 21 and the base plate 30 are secured in position with respect to the lower rim 20 of the shell, the elongate rod 10 may be urged via a screw thread on the rod, and a tapped bore in the base plate 30

to urge the plate 15 away from the base plate 30, and expand the bollard shell in a direction along the main length of the shell.

The pressure plate member is selected in shape, to closely fit the upper end of the bollard in its original manufactured shape. The pressure plate 15 is interchangeable so that a series of pressure plates of different shapes corresponding to different bollard types may alternatively be attached to the rod 10.

There may be further provided, a second laterally expandable plate assembly (not shown in figures 2,3), substantially similar to the one described above, and comprising a second base plate and a third and fourth laterally urgeable side plates, for urging the sides of the bollard shell apart, the second expandable plate assembly being provided at a position midway along the length of the bollard shell.

With the bollard submerged in the heated fluid, the shell may be left for a period, for example two to four hours, to allow the plastics shell to gradually expand from the crushed or semi crushed state to an expanded state, the expanded state being the same or very close to the original manufactured shape of the bollard shell. As the process of expansion of the shell may take place over a period of hours, the elongate rod member may be moved with respect to the base plate 30 gradually, to gradually expand the shell in a set of increments, movements being made over the period in which the shell is left in the heated fluid.

The heated fluid preferably contains a set of conventional detergents and cleaning agents, for removing grease, dirt etc. from the shell during the expansion and fluid bathing process.

During the expansion process in the fluid bath, the shell may be hung fully submerged in the fluid from a rail 40 placed across the tank, as shown in figure 2.

The duration of the expansion period for a particular bollard is determined by the extent of damage and deformity of the bollard, and the type of plastics material of the bollard. The duration of the expansion period is determined to end when, by a visual inspection, it is judged that the bollard has resumed its original shape, or substantially so.

The expansion period for a PTFE shell, is suitably found to be around four hours where the fluid temperature is in the range 60-80°C. At the end of the expansion period, the shell may be cooled, by allowing the fluid to cool through normal conductive or convective heat loss, or by adding a coolant fluid to the bath. For example cold water may be poured into the bath to reduce the temperature of the fluid. The expansion frame and bollard shell may then be removed from the bath, the shell being cooled to room temperature. Further stages of cleaning and refurbishment of the bollard then take place.

The bollard may be thoroughly abrasively cleaned by hand or by mechanical means, eg. an electric drill with abrasion attachment, or by manual application of a wire pan scrub, to abrade and scrub clean the inner and outer surfaces of the bollard shell. Manual abrasion of the surface of the

shell using, for example a wire brush or wire pad and conventional cleaning agents has been found to be particularly effective in removing ingrained grime and dirt from the shell.

With the bollard in the expanded state, resembling the original manufactured state of the bollard, any splits or cracks in the bollard shell may then be repaired by heating the outer or inner surface of the shell using a conventional hot air welding gun having a fan shaped nozzle, to direct a substantially planer hot air stream over the surface of the shell and weld together adjacent edges of a crack or split. Such hot air welding guns are conventionally known in the field of plastics fabrication.

Then, surface glazing of the shell is performed by directing a blow torch, also having a suitable shaped nozzle, for example fan shaped, over the surface of the shell portion containing the crack or split and over the outer surface as a whole. The blow torch is drawn over the inner or outer surface of the shell at a rate such as to allow melting of the surface of the shell. During this process, the plastics material on the surface of the shell melts and re-sets to adopt a glazed finish. To achieve an optimal result, only the blue, cooler part of the blow torch flame should be used on the plastics shell, and the blow torch should be drawn with respect to the shell at a sufficient rate to avoid burning or combustion of the plastics material. By drawing the hot air gun and/or blow torch over the entire outer surface of the shell, a glazed finish can be achieved on the shell, in which the outer surface layer of the plastics shell has melted under heat and then become reset under cooling.

Once the shell has been welded and glazed as described above, any signs on the bollard may be refurbished by applying a printed translucent

sticker over the surface of the shell at the appropriate portion. The sticker may be applied using a conventional plastics adhesive. Alternatively a plastics film transfer sticker may have a self adhesive backing for sticking to the bollard shell.

It will be appreciated that the above procedures may be automated or semi automated, and various stages such as abrasion of the shell of the bollard may be performed using power tools. The fluid in the tank may be electrically heated and electrical temperature control means may be provided to control the temperature of the fluid. Further, the placement of the bollards in the fluid tank may be made by an automatic frame apparatus to which one or a plurality of extension frames are attached, the automatic frame apparatus automatically lowering the bollard(s) into the tank of heated fluid for a predetermined time at a predetermined temperature.

Specific embodiments and apparatus according to the present invention may provide an advantage of allowing refurbishment of damaged or dirty existing plastics bollards, the possible refurbishment of which, has hitherto been overlooked and un-appreciated.

The reader's attention is directed to all papers and documents which are filed concurrently with or previous to this specification in connection with this application and which are open to public inspection with this specification, and the contents of all such papers and documents are incorporated herein by reference.

All of the features disclosed in this specification (including any accompanying claims, abstract and drawings), and/or all of the steps of any

method or process so disclosed, may be combined in any combination, except combinations where at least some of such features and/or steps are mutually exclusive.

Each feature disclosed in this specification (including any accompanying claims, abstract and drawings), may be replaced by alternative features serving the same, equivalent or similar purpose, unless expressly stated otherwise. Thus, unless expressly stated otherwise, each feature disclosed is one example only of a generic series of equivalent or similar features.

The invention is not restricted to the details of the foregoing embodiment(s). The invention extends to any novel one, or any novel combination, of the features disclosed in this specification (including any accompanying claims, abstract and drawings), or to any novel one, or any novel combination, of the steps of any method or process so disclosed.

CLAIMS

1. A method of refurbishment of a plastics bollard shell from a collapsed state to an expanded state, the method comprising the steps of:

(i) submersing the shell in a heated fluid for a predetermined period; and

(ii) mechanically urging the shell towards the expanded state.

2. A method according to claim 1, comprising the step of, whilst the shell is submerged in the fluid, subjecting the shell to ultrasonic vibrations which are transmitted through the fluid.

3. A method according to claim 1 or 2, wherein the shell is urged towards the expanded state whilst the shell is submerged in the fluid.

4. A method according to any one of the preceding claims, in which the shell is submerged in the fluid which is heated to a temperature in the range 50°C to 110°C.

5. A method according to claim 4, in which the temperature of the fluid is maintained in the range 60°C to 80°C.

6. A method according to any one of the preceding claims, in which the shell is submerged in step (i) for a predetermined period which is in the range one to seven hours.

7. A method according to claim 6, in which the shell is submerged in step (i) for a predetermined period which is in the range two to five hours.

8. A method according to any one of the preceding claims, in which one or more chemical cleaning agents are dissolved in the fluid for cleaning surfaces of the shell during the predetermined period.

9. A method according to any one of the preceding claims, in which in said step (ii), the shell is outwardly urged in the direction along a main length of the shell, and in a direction transverse to the main length of the shell.

10. A method according to claim 9, in which the shell is urged outwardly in a gradual outwardly expanding movement.

11. A method according to claim 9 or 10, in which the shell is urged outwardly in a set of discrete step wise movements.

12. A method according to any one of the preceding claims, in which, during the predetermined period, the shell is completely surrounded by the fluid.

13. A method according to any one of the preceding claims, comprising holding the shell in an inverted state in the fluid such that the fluid may be contained within the shell and around the shell.

14. A method according to any one of the preceding claims, in which a lower rim of the shell is expanded prior to expansion of the shell in a direction lengthwise of the shell.

15. A method according to any one of the preceding claims, further comprising the step of, with the bollard removed from the fluid, locally heating an outer and/or inner surface of the shell to a temperature selected to melt a thin surface layer of the shell material, and then allowing the melted thin surface layer to cool into a set state.

16. A method according to any one of the preceding claims, in which, after or during the stages (i) and (ii) above, the inner and/or outer surface of the plastics shell is mechanically abraded.

17. A method according to any one of the preceding claims, including the step of adhering a sticker to the bollard shell, the sticker being printed with a sign.

18. A method of refurbishment of a plastics shell, the method comprising the steps of:

(a) submersing the shell in a fluid for a predetermined period; and

(b) subjecting the shell to ultrasonic vibrations transmitted through the fluid.

19. A bollard expansion apparatus for expanding collapsed hollow plastics bollard shell into an expanded state in which the bollard shell substantially resumes its original manufactured shape, the apparatus comprising:

a fluid bath for containing a fluid; and

an expansion frame for expanding the bollard shell towards the original shape,

the apparatus being arranged such that the bollard shell can be submerged in the fluid in the bath such that the fluid completely surrounds inner and outer surfaces of the bollard, the frame being arranged to be adjustable for expansion of the bollard shell from an initial collapsed state to the expanded state, in which the bollard substantially resumes its original manufactured shape.

20. An apparatus according to claim 19, in which the expansion frame comprises an elongate member having first and second ends, the elongate member arranged to fit in use, along a main length of the bollard shell between a lower end and an upper end thereof, the elongate member being provided with means for expanding a wall of the bollard in a direction transverse to the main length of the bollard, and means for expanding the bollard in a direction along the main length of the bollard.

21. An apparatus according to claim 19 or 20, in which the frame comprises means for laterally expanding the bollard at a position between the first and second ends, in a direction transverse to the main length of the bollard.

22. A bollard expansion apparatus according to any one of claims 19 to 21, in which the means for expanding the bollard in the lengthwise direction comprise a threaded rod arranged to urge against a base plate. Preferably the base plate is secured at the lower end of the bollard, by the means for

expanding the lower end of the bollard in a direction transverse to the main length of the bollard.

23. A method according to any one of the claims 19 to 22, in which the means for expanding the lower end of the bollard in a direction transverse to the main length of the bollard comprises first and second plates arranged to face outwardly from the elongate member and extend in a direction transverse thereto.

24. A method according to any one of the claims 19 to 23 in which the frame comprises attachment means for attaching one end of the frame to the lower end of the bollard, for anchoring the frame to the lower end. The means for expanding the bollard in a direction along the main length of the bollard may urge against the attachment means.

25. A method of refurbishment of a plastics shell substantially as herein described with reference to figures 2 and/or 3 of the accompanying drawings.

26. An apparatus for refurbishment of a plastics shell substantially as herein described with reference to figures 2 and/or 3 of the accompanying drawings.

19

Patents Act 1977
Examiner's report to the Comptroller under Section 17
(The Search report)

Application number
GB 9514410.1

Relevant Technical Fields

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(ii) Int Cl (Ed.6) B29C 67/00, 73/00

Search Examiner
MR M SIDDIQUE

Date of completion of Search
16 OCTOBER 1995

Databases (see below)
(i) UK Patent Office collections of GB, EP, WO and US patent specifications.

(ii) ONLINE: WPI

Documents considered relevant following a search in respect of Claims :-
1-17, 19-26

Categories of documents

X: Document indicating lack of novelty or of inventive step.

Y: Document indicating lack of inventive step if combined with one or more other documents of the same category.

A: Document indicating technological background and/or state of the art.

P: Document published on or after the declared priority date but before the filing date of the present application.

E: Patent document published on or after, but with priority date earlier than, the filing date of the present application.

&: Member of the same patent family; corresponding document.

Category	Identity of document and relevant passages		Relevant to claim(s)
A	GB 1598125	(KLASEMA) page 2 lines 73-86; page 3 lines 11-15 etc	1. 19
X	GB 1067285	(BATTELLE) page 7 lines 43-62; Figure 15; known technique of softening plastic wall of hollow member by immersing in heated fluid followed by applying radially outward pressure from inside	1. 19 at least

Databases: The UK Patent Office database comprises classified collections of GB, EP, WO and US patent specifications as outlined periodically in the Official Journal (Patents). The on-line databases considered for search are also listed periodically in the Official Journal (Patents).